

# **BOSNIA: DOES FORCE XXI TECHNOLOGY SOLVE THE OPERATIONAL LOGISTIC PROBLEMS IN OPERATIONS OTHER THAN WAR?**

**A MONOGRAPH  
BY  
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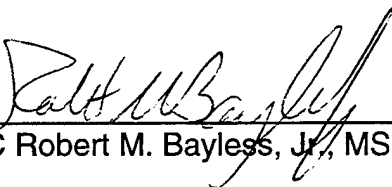
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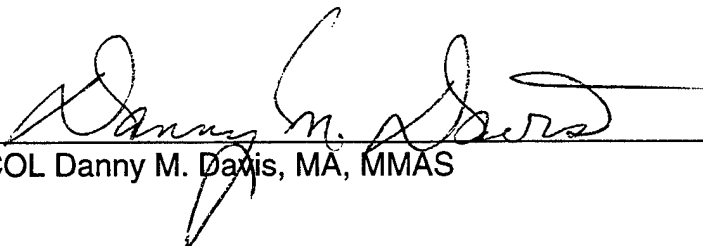
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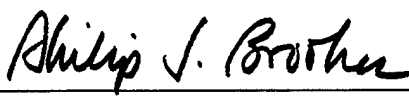
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## ABSTRACT

Bosnia: Does Force XXI Technology Solve the Operational Logistic Problems in Operations Other Than War? By Major Carl D. Bird III, USA, 41 Pages.

The army's charter is to fight and win the nation's wars, however, history has shown that the most frequent operations the armed forces will be involved in fall into the realm of Operations Other Than War (OOTW). Further, as the army develops the concepts, procedures, and technologies to fight future wars we must not forget that these advances in technologies, concepts, and procedures must serve as a catalyst to enhance our ability to conduct OOTW. For the logistician, OOTW means extended lines of communication, dispersion of supported units, and force protection of equipment and personnel in an environment that is austere in nature. These characteristics of OOTW require that the future advances in Force XXI enable the logistician to have situational awareness of supplies and equipment while enabling him to protect support forces from the numerous threats, sometimes ambiguous in nature, that are prevalent in OOTW.

The monograph accomplishes this assessment by using Bosnia as a case study to apply the conceived logistic technologies in Force XXI. The monograph orients the reader to the origin and nature of the conflict in Bosnia by reviewing the history of the Balkans prior to the outbreak of war, during the United Nations buildup, and finally the transition to North Atlantic Treaty Organization (NATO). The monograph then assesses current logistic doctrine at the operational level of war to develop a framework in identifying problems in Bosnia along with OOTW and future doctrine. The monograph then identifies the operational logistic problems in Bosnia and analyses the impact of Force XXI technologies to come to a solution of the stated problem.

Finally, the monograph comes to a conclusion on the impacts of Force XXI technologies in solving the operational logistic problems associated with operations in Bosnia. The monograph shows that Force XXI technology solves the logistic problems in Bosnia by protecting support forces, increasing the ability of logisticians to execute Reception, Staging, Onward Movement, and Integration (RSOI) operations, manage and distribute materiel, position facilities, redeploy the force, and manage the lines of communications. Further, it allows the logistician to accomplish all of the operational logistic functions in an austere environment with extended lines of communications to dispersed forces. Force XXI technology enables the logistician to conduct support operations in OOTW in a more efficient manner enabling the accomplishment of the commander's objectives and goals.

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## CHAPTER 1: INTRODUCTION

“The effectiveness of future military operations will be tied to the CSS capability to project receive, and support the force.”<sup>1</sup>

TRADOC Pam 525-5  
Force XXI Operations  
1 August 1994

### Section 1. Background

Shortly after the war in Iraq, the United States Army realized that there were some significant shortfalls in logistic operations. In an effort to fix the logistic problems of Desert Storm, the United States Army developed logistic technologies for a future force that would be more mobile, highly lethal, and smaller. Solutions to the problems of Desert Storm were incorporated in the logistic concept of Force XXI.

As the army forges its way into the 21<sup>st</sup> century, logisticians have tried to keep pace by conceiving and implementing new technologies to support the army's fighting force of the future. These technologies are designed to be more efficient thus, requiring a smaller logistic force, and provide the logistician a common picture of logistic resources on the battlefield. Even though the army's main and primary purpose will remain “to fight and win the Nation's wars by establishing conditions for lasting peace through land force dominance”<sup>2</sup> the army has been, in the last decade, involved in more Operations Other Than War (OOTW) than major land conflicts. In a world going through rapid changes, OOTW will continue to be a significant part of the army's charter. This fact leads to the logical question, are the technologies being developed for future warfare conducive to OOTW?

If history continues to repeat itself, the United States Army will be involved in an increasing number of OOTW missions. Will the technologies, developed for combat operations in the 21<sup>st</sup> century, be applicable in the OOTW of the future? If the army will continue to be engaged in arguably more OOTW missions than war time missions, in other words, if history continues to show the same pattern, then logisticians must ensure that the logistic fixes for the army of the future apply to all operations. By studying the most recent OOTW and applying the most current Force XXI logistic enablers we can gauge the effectiveness of those technologies in solving logistic problems in support of OOTW.

## **Section 2. Purpose**

The purpose of this monograph is to identify the operational logistic problems in the Bosnia operation and apply current Force XXI technologies to better understand the impact of these technologies on future OOTW. This will allow logisticians the ability to modify existing Force XXI technologies or develop new technologies to assist in solving the problems associated with future OOTW. Further, this will allow the future logistician the ability to conduct logistic operations that support soldiers and commanders more efficiently in OOTW.

In order to achieve this goal this monograph will answer the question, can Force XXI logistic technology solve the operational logistic problems in Bosnia? In order to answer the primary research question the following research questions must be answered:

What are the events leading to the deployment of army soldiers to Bosnia?;

What defines operational logistics?;

What is the current US doctrine for logistic operations and peace keeping operations?;

What are the logistic lessons from Bosnia?;

What are the Force XXI logistic enablers?; and

Can these enablers solve specific logistic issues as currently conceived?

## **Section 3. Methodology**

In order to answer the above questions the monograph must first analyze the historical events leading to the United States involvement in the region. This will allow an understanding of the causes of the Bosnian crisis and the setting of the situation United States Armed Forces found themselves in when deploying to the region. Further, the history of the region leading up to the current crisis will set the stage in which logistics must operate. The monograph will use current logistic doctrine to define the functions of operational logistics and will analyze the army's current peacekeeping doctrine. This will allow the development of a framework by which we can apply future Force XXI technologies and doctrine. Further, the monograph will identify the operational logistic problems associated with the operations in Bosnia by researching lessons learned from the Center for Army Lessons Learned (CALL) and interviews with logistic

planners in the Bosnian theater. This will allow the monograph to then apply future Force XXI technology enablers to the problems identified and come to a conclusion on the effectiveness of Force XXI technologies to solve the operational logistic problems associated with OOTW.

#### **Section 4. Organization**

The paper will be organized in four parts. They are the introduction, main body, analysis, and conclusions. The introduction outlines the problem the paper hopes to solve, purpose of the paper, methodology in solving and identification of problems, and the organization of the paper. The main body of the paper will identify the history of the former Yugoslavia which will allow an understanding of why there is a need for intervention in the region. Further, it will give an understanding to the reader of the problems facing forces and the logistics needed to support them in their efforts to stabilize the region. The main body will identify current OOTW doctrine and the functions of operational logistics in order to set a framework in which to identify problems and apply technology. The main body will identify Force XXI logistic enablers, new doctrine, and emerging logistic concepts associated with Force XXI. The analysis section of this monograph will then apply the anticipated effects of emerging logistic technology and doctrine to the identified problems and reach a conclusion on the effectiveness of Force XXI technology to solve the operational problems associated with Bosnia. Finally, the paper will come to a conclusion and will answer the question, can Force XXI logistic technology solve the operational logistic problems in Bosnia?

As stated earlier, in order to answer the primary research question it is necessary to understand the events leading up to the current crisis in the region. This will give us an understanding of the nature of the conflict, logistical implications associated with the conflict, and help identify the operational area involved. Therefore, the next section of the monograph will address the historical aspects of the Bosnian conflict.

## **CHAPTER 2: UNDERSTANDING THE PROBLEMS OF THE BALKANS**

“One of the most frequent, pejorative descriptions of Yugoslavia is that it was an artificial creation.”<sup>3</sup>

The Yugoslav Conflict  
John Zanetica  
Adelphi Paper 270

### **Section 1. Introduction**

The history of the former Yugoslavia is marked by numerous influences that have shaped the destiny of the people of Yugoslavia. In order to grasp the complexities of the Yugoslavian state it is necessary to concentrate on the religious, economic, ethnic, cultural and nationalist tendencies of the region. The above topics speak to the influence of the Orthodox Catholic church, Muslim Turkish influences and the Roman Catholic influences in the region. Further, the economies in the region are vastly different from one another with Serbia being land locked, Bosnia having the majority of weapons production, Croatia's access to the Adriatic Sea, and Serbian desires to gain access to the Mediterranean Sea. Ethnic clashes in the various regions of the former Yugoslavia spurred on by an intense nationalistic desire to unite Serbs is at the heart of the current chaos in the region. In order to chronologically understand the current events unfolding in Yugoslavia, this chapter will concentrate on the significant historical events effecting the region. Further, this chapter will discuss the current situation in the wake of the breakup of Yugoslavia. The purpose of this chapter is to give the reader an appreciation of the complex environment of the former Yugoslavia and the interaction of the major players in the region. Further, this will allow an understanding of the environment that logistical organizations must operate.

### **Section 2. The Effects of Religion, Nationalism, Economics, Culture, and Ethnicity in the Balkans**

The country of Yugoslavia was formed in December of 1918 and was called the Kingdom of the Serbs, Croats, and Slovenes.<sup>4</sup> The country was renamed to the Kingdom of Yugoslavia in 1929. The country of Yugoslavia was composed of the republics of Slovenia and Vojvodina in the North, Croatia and Bosnia-Herzegovina in the center, Serbia in the east, and Montenegro, Kosovo, and Macedonia in the south.

This area is surrounded by the countries of Austria, Hungary, Romania, Albania, Greece and Bulgaria. Further, the former Yugoslavia's western boundary lies on the Adriatic Sea.<sup>5</sup> The republics of the former Yugoslavia were the central land gateways from the Mediterranean to the south-east of Europe.<sup>6</sup> This fact is important in understanding the development of the ethnic, religious and cultural make-up of the Balkans. Further, because the Balkans are a natural land route to the south of Europe many of the larger countries surrounding the Balkans had a direct interest in controlling these routes in order to influence the commerce in the area. The fact that the Balkans are a natural gateway to the south of Europe explains why so many countries had an effect on the religious, ethnic, cultural, economic, and nationalist influences that dominate the region to this day.

In order to grasp the problem of religion in the former Yugoslavia we must examine the impact of the Roman Empire on the Balkans, Russian Eastern Orthodox influences, the expansion of the Ottoman Empire and the influences the Turks had on the Balkan states and the Reformation.

In the third century B.C. the Roman Empire started to influence the region mainly in the areas bordering the Adriatic Sea.<sup>7</sup> The reason was to influence shipping and trade in the area but later the effect of the breakup of the Roman Empire in 285 A.D.<sup>8</sup> would serve to divide the Balkans hence the effect of religion in the area. The Eastern half of the Roman Empire the predominant religion was Orthodox while the western half of the Roman Empire was influenced by Roman Catholicism. During this time we see the influence of Roman Catholicism on Croatia, Slovenia, and Bosnia-Herzegovina while Serbia and Montenegro came under the influence of the Orthodox church.<sup>9</sup>

In the early sixteenth century the Ottoman Turks invaded the Balkans up to the Sava River.<sup>10</sup> This invasion lead to the spread of Islam throughout the Balkans. In "Yugoslavia: A Country Study" the author says this about the Islamic Community in Yugoslavia:

Yugoslavia's Islamic community, the largest in any European country west of Turkey, was concentrated among three ethnic groups: Muslim Slavs, located in Bosnia and Hercegovina and Kosovo; ethnic Albanians, primarily in Kosovo, the enclave of Novi Pazar in Serbia, and Macedonia; and Turks inhabiting the same regions as the Albanians. Most of the Muslim Slavs and Albanians converted to Islam in the early stages of Ottoman occupation to gain the higher social status that Ottoman policy afforded to converts. They were the only groups in the European provinces of the Ottoman Empire to convert in large numbers.<sup>11</sup>

The influence of the invasion of the Ottoman Turks into the Balkans was a catalyst in the spread of Islam throughout former Yugoslavia. The influence of the Turks in the province of Kosovo is of significant importance to the Serbs today. The Serbs consider Kosovo as a historic, cultural and spiritual center<sup>12</sup> because of the 1389 battle involving the Turkish and Christian armies. "The Christian army included Serbs, Albanians, Croats, Bulgarians and Hungarians. Victory, however, lay with the Turks, and the flower of the Serb aristocracy fell in the battle."<sup>13</sup> This dispute of the republic of Kosovo is only one of the many problems plaguing the Balkans in the current crisis.

During the early part of the sixteenth century the Reformation found great support amongst the Slovenes. The Protestant religion saw great support not only from nobles but from most of the population in the major cities. One of the biggest impacts of the Reformation was in the use of the Slovene language.<sup>14</sup> This would give the Slovenes a sense of nationalist pride. The writing of books during this time in the Slovene language would spark an increased interest in the learning of the Slovene language. The Reformation was supported by the Parliament, however it was brutally put down by the Austrians and the Jesuit priests. The Counter Reformation sought to return the area back to Roman Catholicism and succeeded but not before there could be a stimulation of Slovene awareness which would reappear to add to the current crisis faced in the area today.<sup>15</sup>

The former Yugoslavia is made up of a diverse ethnic population. Ethnicity coupled with a rebirth of nationalism is at the root of the problems plaguing the Balkans. The diversity of ethnic groups in the area seems to start with the domination of the area by the Slavs in about the sixth century. The Slavs consisted of three groups: the Slovenes; the Croats; and the Serbs.<sup>16</sup> The Slovenes would move to the province just south of Austria known today as Slovenia, the Croats would move the region just south of the Slovenes in Croatia and the Serbs would occupy areas to the west. In 1278 the Slovenian lands would fall under the rule of the Habsburgs who would control them until after World War I.<sup>17</sup>

The Croats would live under loose Byzantine rule up until the eighth century. In 924 Croatia would emerge as an independent nation and would struggle with Vienna over the ownership of Dalmatia, the far western territories along the Adriatic Sea.<sup>18</sup> This struggle over the coastal territory would come to play a major factor in the disputes of Serbia and Croatia today. The ownership of the former Dalmatia translates

directly into commerce and trade. In Serbia's case, the ownership of Dalmatia would give Serbia access to the Mediterranean Sea thus enabling the expansion of the Serb economy. In 1091 the Croatian crown was accepted by the king of Hungary, Laszlo I. This link to the Hungarian crown would last until the end of World War I.

The Serbs would initially be under the rule of the Byzantine Empire however, in the twelfth century, the Serbs would escape the domination of the Byzantine Empire and rule their own affairs up until the late fourteenth century. The defeat of Serb forces by the Turks in 1389 would make portions of Serbia vulnerable to Turkish influence, however the Civil War involving the Ottoman Empire in the fifteenth century saved Serbia from being conquered for a time.<sup>19</sup> The real spread of ethnicity in the Balkans was due to the invasion of the Ottoman Turks starting in the late fifteenth century. The first to be conquered were the Serbs in 1459. The Serbs fled the onslaught to Hungary, Dalmatia, Croatia, and Bosnia.<sup>20</sup> The Austrians in fear of being overrun by the Turks would establish a frontier manned with Germans, Hungarians, and Serbs to stop the onslaught.<sup>21</sup> The invasion of the Turks had the effect of moving the populations from one location to the other mixing ethnic groups in the different regions. The existence of the ethnic enclaves currently in the countries of Croatia and Bosnia are a result of the actions of the Turks. The rise in nationalism brought on by Slobodan Milosevic in the 1980s<sup>22</sup> sought to unite Serbs in the enclaves of Croatia and Bosnia with an eye to forming a larger Serbia.

The economic problems in the region mostly center around access to the Mediterranean Sea. Prior to World War I the Russians wanted access to the Mediterranean Sea via the Dalmatian coast. Because Serbia is land locked there is great dispute over the western coast of former Yugoslavia. The Serb enclaves at Knin are just one of the disputes over coastal territory. This Serbian enclave is a central communications junction between the Croatian capital of Zagreb and the tourist industry on the Dalmatian coast.<sup>23</sup> This is just one of the economic disputes. During the early nineteenth century, France influenced the area significantly with the defeat of Austria by Napoleon. The French influence would extend through Slovenia, Croatia and Dalmatia. The French would build roads, increase agriculture production, and fight piracy on the Dalmatian coast thus ensuring unmolested trade.<sup>24</sup> As stated in the beginning of this chapter the Balkans were a land trading route to the southern portions of Europe. This coupled with the gold, silver and copper

mined in the Balkans increased their importance to her trading partners in the north and south of the region.<sup>25</sup> The importance of the Balkan states to trade prior to World War I is the reason for the foreign cultural influences found there today. The importance of the western coast and the part it played on commerce is a partial reason for the conflict in the Balkans today.

### **Section 3. Yugoslavia after Word War I**

As mentioned at the beginning of Section 2 of this paper, Yugoslavia was formed in 1918 as the Kingdom of the Serbs, Croats and Slovenes. The significance of this is that the new kingdom included the former republics of Serbia and Montenegro which had been independent since 1879.<sup>26</sup> The most spectacular thing was that Croats, Serbs and Muslims were all living together in the most diverse of the former Habsburg holdings which was and still is Bosnia-Herzegovina.

The economic situation after World War I was bleak. The new government needed to repair damages inflicted on the infrastructure after the war. Three quarters of the population was employed in the agricultural sector of the economy. In the interior of the country mining of the natural resources of Yugoslavia as well as expanding industry were the priorities. As the result of the regions lack of capital, the country sold mining rites to foreign countries in order to build roads and rail systems. In 1922 Yugoslavia, Czechoslovakia, and Romania signed what was known as the Little Entente which won support from France because it sought to contain Russia and Germany.<sup>27</sup>

In September of 1931 the government of Yugoslavia passed its first constitution which sought to give a wide range of liberties while still "ensuring national unity by keeping the royal power intact and only permitting the existence of nation-wide parties."<sup>28</sup> This constitution provided the first steps toward democracy.

In 1941 Yugoslavia was invaded by Germany. In administering Yugoslavia the Germans established an independent state of Croatia which included Bosnia-Herzegovina.<sup>29</sup> This new state carried on a forced conversion of the Orthodox Serbs. This included a massacre of approximately 400,000 Serbs by Croat nationalists in the new Croatian state. This produced a Serbian resistance which was assaulted not only by the party installed by the Nazis but also Tito's communist party. Tito's party grew in strength until

the British recognized it in 1943.<sup>30</sup> In 1944 the Germans were thrown out of Yugoslavia with the help of the Soviets.

After World War II, Tito came to power and established Yugoslavia as a Federation of Six republics Serbia, Croatia, Slovenia, Bosnia-Herzegovina, Macedonia, and Montenegro. The split of the country into republics led to the ethnic mixing finding Serbs and Croats on wrong sides of the borders. This did not have the effect of antagonizing the ethnic populations because these borders were administrative in nature.<sup>31</sup> Because of the inability to draw effective borders due to the mixing of Serbs, Croats, and Muslim Slavs Bosnia became a republic of Yugoslavia.<sup>32</sup> In 1980, Tito died leaving behind a system of rotating leadership. In 1987, the leadership changed again and brought Slobodan Milosevic, to power who preached Serbian nationalism aiming first at Kosovo.

After the fall of the Soviet Union in 1989, Yugoslavia faced its own collapse. Slovenia was the first to seek independence and succeeded in June 1991.<sup>33</sup> The opposition to the independence of Slovenia was light with Yugoslavia sending in the People's Army of Yugoslavia (JNA) which was made up of a mostly Serb officer corps.<sup>34</sup> This force only stayed for three weeks before the acknowledgment of Slovenia independence. Croatia was the next to request independence from the international community. This the JNA resisted harshly with a big reason being Croatia's inclusion of the former Dalmatian coast. This caused Croatian officers in the JNA to switch allegiance which left the JNA 90% Serbian. The JNA occupied areas of Bosnia-Herzegovina and waged its war with Croatia. During this time there was significant fighting and atrocities committed by each side on Serbian and Croatian enclaves. In January 1992 the United Nations brokered a cease fire however, Serbs had control of the former Yugoslavian army and its associated equipment. Serbia would not let go of Bosnia. Part of the reasons were the nationalist feelings towards Serb enclaves in Bosnia, the other reason was the war industry of the former Yugoslavia was located in Bosnia.<sup>35</sup> The JNA pulled out in April of 1992 and left 54,000 Serb soldiers fully armed to ensure Bosnia would not be given independence without Serbian intervention. In May of 1992 talks in Belgrade broke down and the war turned Sarajevo into "the Beirut of Europe".<sup>36</sup>

#### **Section 4. NATO Involvement**

The involvement of NATO is a result of the United Nations (UN) inability to stop the ethnic cleansing and violence in Bosnia-Herzegovina. In fact, NATO's involvement in Bosnia is marked by the ineffectiveness of the UN organization to employ force as a means of stopping the violence that plagued the region. The events leading up to NATO's involvement in the region are highlighted by the constant breaking of cease-fires and negotiated peace settlements. In January of 1995 former President Jimmy Carter negotiated a cease-fire which was frequently broken by both the Bosnian Serbs and Croats.<sup>37</sup> In May of the same year the cease-fire is broken by a major Croatian offensive and a subsequent Serb counter-offensive. This latest action on the part of the belligerents causes the UN forces to force the Serbs to remove all heavy weapons from around Sarajevo. The lack of compliance with the new UN directive brings on the first NATO involvement in the war resulting in air-strikes against the Serbs.<sup>38</sup> In August, NATO forces threaten to strike Serbs if the Serbs refuse to stop attacks on UN safe havens. The NATO planners develop a target list comprising air-defense radars, communication sites, ammunition storage, and command posts. Later in the month NATO would have to execute its target list because of Serb non compliance with removal of heavy artillery from UN exclusion zones.<sup>39</sup> In September and October negotiations are conducted between the Muslims, Croats and Serbs. The negotiation results in another cease fire and calls for a "single entity Bosnian state made up of two parts."<sup>40</sup> This negotiated settlement is based on the restoration of utilities in Sarajevo. Again this cease-fire fails, however in November negotiations occur in Dayton, Ohio and on December the third President Clinton gives the initial deployment order authorizing US forces to deploy to Bosnia as part of NATO's Implementation Force (IFOR).<sup>41</sup> On December the 14<sup>th</sup>, in Paris, the warring factions signed the General Framework Agreement for Peace (GFAP), the verification for execution would fall into the hands of NATO.<sup>42</sup>

The American component of the NATO force would be the First Armored Division, Task Force Eagle (TFE). TFE would be organized as a multi-national unit and would consist of the following forces; two US armor brigades, a Turkish mechanized brigade, a Russian airborne brigade, and a NORDPOL brigade consisting of Denmark, Sweden, Poland, Lithuania, Estonia, Finland, Latvia and Norway.<sup>43</sup> TFE would be one of three divisions constituting the IFOR under the control of the Allied Ready Reaction Corps

(ARRC) headquartered in Sarajevo. The US would also provide a National Support Element (NSE)<sup>44</sup> which would operate the Intermediate Staging Base (ISB) in Taszar Hungary.<sup>45</sup> The NSE was comprised of elements of the 21<sup>st</sup> TAACOM commanded by MG Wright whose job it was to facilitate the movement and sustainment of units into the Area of Operation. This is the setting for the analysis of how Force XXI technology can support Operations Other Than War (OOTW).

## **Section 5. Conclusion**

As was described thus far in the monograph, the reasons for the breakup of the former Yugoslavia is based on religious, ethnic, nationalism, cultural, and economic reasons. These accelerators of the conflict, have implications on the sustainment of the operations in Bosnia. The implications are force protection, extended lines of communications, multi-national support, weather and terrain, command, control, and communications (C<sup>3</sup>) and the ability to use existing infrastructure.

Due to the nature of the threat in Bosnia, the fact that the threat is asymmetrical, due to the lack of a well defined rear area, force protection of logistic forces operating through the depth of TFE's sector is of the utmost concern. The nature of the history of the area implies that there are pockets of different ethnic and religious peoples throughout the area of operations. Further, the tenuous nature of past cease fires would make it likely that the factions might resume fighting in the area which would cause TFE to switch from peace operations to combat operations rapidly. If this occurred it would be possible for the warring factions to cut off support from the ISB located in Taszar. This hypothetical situation speaks directly to the ability of the ISB to provide continuity of support if fighting between the factions resumes. The threat of mines also serves to decrease the continuity of support and "presents a large mobility challenge."<sup>46</sup>

As we can see from the historical background of the situation in Bosnia, TFE has extended lines of communications from Taszar to the support units of TFE. The lines of communications run through Hungary into Croatia and through Croatia into Bosnia. Bruce E. Akard in his monograph says this about the Lines of Communication (LOC);

"Highway movement was initially considered by the movement planners as an unlikely option due to difficulty in gaining country clearances for routes. Also, USAREUR had problems sustaining convoys over such long distances. However, USAREUR decided to deploy units by road due to increased rail congestion and the poor weather conditions for aircraft flight."<sup>47</sup>

In addition to long LOCs, the forces in Bosnia would have to deal initially with harsh weather, poor roads, and numerous choke points along the Main Supply Route (MSR) that could be easily interdicted. Snow and ice makes travel by road tenuous at best. Further, as the quotation above states these weather conditions decrease the options available to the logistician to supply the forces in the area of operations. Weather plays a major factor, but terrain for logisticians presents problems in C<sup>3</sup>. The Initial Impressions Report says this of terrain, "The mountainous terrain of the region seriously limited the effectiveness of line of site communications."<sup>48</sup> The poor terrain will be a factor in the transmission of logistic data, and affect tracking systems.

The inclusion of multi-national forces in TFE requires the logistic system to respond to supply items that may be out of the norm. These are items related to differences in type equipment, possibly fuel requirements for the task force. The nature of operations in Bosnia require the logistic system to be flexible and compatible to other nations logistic needs and systems. Further, as the US military conducts future OOTW missions, the likelihood is that these operations will be more joint and multinational in nature requiring the supply system to become more flexible in order to handle the diverse nature of requests.

Finally, as the Croats, Muslims and Serbs fought it out in Bosnia, the conflict had done a great deal of damage to the infrastructure of the nation. This will impact on the ability of forces to obtain Host Nation Support (HNS), which will put more strain on the logistic system in Hungary to support the soldiers in Bosnia. The use of Logistic Civil Augmentation Program (LOGCAP) will become critical to build life support facilities, maintenance facilities, and improve force protection measures.<sup>49</sup>

This chapter has laid down a structure of events that help the reader understand the problem facing TFE. It concluded with the logistic implications of the area of operations brought on by an analysis of varying factors in the area of operations. The next chapter of the monograph deals with current US doctrine concerning logistics and OOTW operations. This will help us develop a framework where we can apply Force XXI doctrine and technology to solve the logistic lessons learned in Bosnia.

## CHAPTER 3: DOCTRINE

"Doctrine describes how ... forces think about applying the basic principles of war and operations other than war and the conditions, and influences in which they may be called upon to operate."<sup>50</sup>

FM 100-5  
Operations  
June 1993

"Doctrine is descriptive, but not prescriptive; authoritative, but not authoritarian; definitive, but not dogmatic. Doctrine guides actions of military forces in support of national objectives; leaders apply it with judgment."<sup>51</sup>

FM 100-5  
Operations (Final Draft)  
August 1997

### Section 1. Introduction

The purpose of this portion of the paper is to set a framework in which we can analyze the impact of Force XXI technology on Operations Other Than War (OOTW). In order to accomplish this task this portion of the paper will define operational logistics, the logistic functions of operational support, current OOTW doctrine, and future Force XXI doctrine. By doing this we can identify the unique differences in support to OOTW and war, and establish a framework to later apply technologies and lessons learned from Bosnia.

### Section 2. What is Operational Level Logistics?

In order to identify a definition of operational logistics we must identify the definition of operational art. FM 100-5, Operations states that at the operational level of war, joint and combined operational forces will plan, conduct and sustain major campaigns in order to achieve the strategic end state of the higher authority.<sup>52</sup> Further, the operational level of war is the connection between tactical battles and engagements and the strategic objectives. If strategic goals are in fact linked to the political ends, then Clausewitz said it best in his book On War, "war is nothing but the continuation of policy with other means."<sup>53</sup> In FM 100-5, Operations (Final Draft) states that the level of war, strategic, operational, and tactical are not linked with a type sized unit. But in fact are linked according to their effects on the battlefield and how these effects relate to the tactical, operational, or strategic objectives.<sup>54</sup>

This argument can further be discussed by arguing the significance of ends, ways and means in relation to military operations. In Schneider's Theoretical Paper No. 3, he makes the argument that ends are the strategic objectives or aims the operation seeks to achieve. This results in the format of an Operation Order (OPORD), which translates to the mission assigned to a unit. The means are the enablers that allow the ends to be achieved. In the category of means falls logistic support, communications, engineer support, and combat forces to name a few. In the OPORD format, the means are Service Support (Para 4), Command and Signal (Para 5), Friendly Forces (Para 1a), and Attachments and Detachments (Para 1c). The ways are the employment of the means to achieve the ends. In OPORD format this is the Execution paragraph in an OPORD.<sup>55</sup>

Another analogy is that of the human body performing a task. If the task is to eat a bowl of cereal for breakfast then the ends are just that to consume the bowl of cereal. This is the strategic objective. The area around the body to include the bowl of cereal becomes the Theater of Operations. For the sake of argument, let's say the center of gravity is the cereal itself, we deem this to be the "hub of all power" according to the thoughts of Clausewitz.<sup>56</sup> The means to accomplish the ends rest in the muscles of the body, blood and oxygen, and the brain. The muscles are the combat forces, in order for them to work the lungs must take in oxygen which is transferred to the blood and fed from the blood to the muscles enabling them to move. The brain becomes the command and control for the body (army) and directs its movements. Ways are achieved by the muscles causing the body to move in a series of actions called maneuver. These maneuvers are mapped out through the use of decisive points. These decisive points allow us to break down the center of gravity in steps. By focusing on the decisive points (operational level of war) we are able to destroy the center of gravity (strategic object) thus achieving the objective.

The same way the illustration above depicted oxygen and blood, it relates to the effects of logistics at the operational level of war. If this is so then operational art is the employment of means to obtain strategic ends through battles and campaigns (ways). If this is the definition of operational art then the art of operational logistics are those logistic means (support units) and ways (concepts of support) that enable the accomplishment of strategic ends. In other words, the art of operational logistics are those activities that allow the commander to attain his strategic end state by sustaining combat power and establishing continuity

of operations by designing logistic operations that enable uninterrupted support of battles and engagements. Logistics enable the commander to achieve his ends. Therefore, operational logistics, as stated by FM 100-16, "is the linkage of strategic logistic assets to tactical CSS in order to ensure success of tactical engagements on the battlefield."<sup>57</sup> Further, operational logisticians produce requirements for strategic logistic assets to fill.<sup>58</sup>

Now we must identify the logistic functions that enable the commander to achieve this linkage. These logistic functions will set the framework for our categorization of Force XXI technologies and lessons learned in Bosnia.

### **Section 3. Operational Logistic Functions**

There are several doctrinal manuals that have parts and pieces to the listing of operational logistic functions. In this section of the paper we will be using FM 100-5, FM 100-8, FM 100-5 (Final Draft), FM 100-7, and FM 100-16 to identify a comprehensive list to set our logistic framework.

FM 100-5, says that "operational logistics focus on force reception, infrastructure development, distribution, and the management of materiel, movements, personnel and health services."<sup>59</sup> FM 100-5, Final Draft says the focus of operational logistics is on "prioritization of deployment, Reception, Staging, Onward Movement, and Integration (RSO&I), CSS in support to the campaign, support to other services, facility positioning, Distribution management, reconstitution operations, host nation agreements, and lines of communication to tactical units."<sup>60</sup> FM 100-7 says the focus of operational logistics is on reception, positioning of facilities, movement control, materiel management, distribution management, reconstitution, and redeployment.<sup>61</sup> Still yet, FM 100-8 gives the following operational logistic concerns; RSO&I, positioning of facilities, material management, distribution management, reconstitution and redeployment.<sup>62</sup> FM 100-16 is more vague about the role of operational logistics, but says the focus of operational logistics is RSO&I of forces, planning and management of logistic support in the form of supply, maintenance, and field services, the management of theater reserve stocks, providing transportation, managing distribution, and providing Health Service Support (HSS).<sup>63</sup> For the purposes of this monograph we will define the operational functions of logistics as RSO&I of forces, materiel management, facility positioning, distribution management operations, reconstitution of army units, redeployment of forces, and management of the Lines

of Communication (LOC) to the tactical units. With the functions of operational logistics identified we must further define these terms.

RSO&I are those functions that enable units integration into the theater. Reception begins at the Port of Debarkation (POD) usually utilizing host nation support assets to assist in the security of the POD, assistance with the off loading of equipment, and to process personnel and equipment in preparation to move to the staging area.<sup>64</sup> In the reception phase of the operation equipment is fixed and fueled in preparation for movement to the staging area. In the staging area unit personnel are reunited with their equipment. Maintenance activities continue to work on fixing broken pieces of equipment. Onward movement starts “when the units are configured to move to their final destination.”<sup>65</sup> This phase of the operation is transportation intensive and requires a great deal of transportation management skills. In this phase of the operation, host nation transportation assets, such as trucks, rail, and Heavy Equipment Transporters (HETs) are used if available and required. If the force is multinational, planners must take into consideration the differences in operating procedures.<sup>66</sup> Integration is nothing more than the transferring of units to a tactical commander.<sup>67</sup>

Materiel management is the anticipation of resources required to sustain the theater. This function at the operational level is critical because the information gained by the operational logistician is then transmitted to strategic materiel sources. This operational function links strategic assets to the tactical functions of arming, fueling, fixing, manning, moving, and sustaining the soldier and his systems. Managers at the operational level anticipate requirements of tactical units and consumption of basic supplies in regards to branches and sequels. Further, they determine priorities in accordance with the commanders guidance to enable operational level operations. In addition, materiel managers balance supply and maintenance operations keeping visibility of critical items.<sup>68</sup>

Operational logisticians are responsible for facility positioning. This is to ensure the facilities required to support operations are located in the correct areas to support the concept of operations. Facilities at the POD are important that they provide shelter for soldiers arriving into theater, storage for equipment and supplies, and basic life support services. These facilities must be located in a way that

supports RSO&I operations. Base camps must be located in areas that are not likely to be effected severely by weather conditions and support the operations taking place.

Distribution management is another key linking strategic support to tactical support. The theater distribution system enables forces to “control the flow of materiel between the point of receipt and the point of issue to using activities within the supply and transportation system.”<sup>69</sup> The theater distribution system will play a major part in the RSO&I process. The distribution system is operated by material managers, transportation managers and support operations organizations.<sup>70</sup> Materiel managers maintain stock to move, transportation managers task assets, and support operations personnel maintain an interface with the customer.<sup>71</sup>

Reconstitution is an action taken to bring units up to a desired level of combat readiness. There are two types of reconstitution; reorganization, and regeneration. Reorganization is a shift in personnel and equipment internal to the unit.<sup>72</sup> Reorganization can be deliberate or immediate, it includes assessing key leadership and Military Occupational Specialties (MOS), major weapon system densities in the subordinate units, and could include formation of one unit from the residual of two units. Regeneration is, for all intent and purpose, the rebuilding of a units combat power. It includes replacement of weapon systems and personnel. Operational planners must consider reconstitution operations in the initial planning of operations. Reconstitution efforts must be anticipated at all levels of command.<sup>73</sup>

Redeployment operations are directed when the commander has achieved his desired endstate. “The key to redeployment is that it should not be considered as retrograde movement, but in fact as a new deployment.”<sup>74</sup> Redeployment should be considered as carefully as combat operations in order to maximize CSS assets as fully and as efficiently as possible. Further more, unit integrity should not be compromised so units could be redeployed immediately ready to fight. Redeployment will again rely heavily on Host Nation Support (HNS) to cover shortfalls in logistic assets.

Finally, operational logisticians should manage the LOCs in theater down to the tactical unit. The purpose of this is to ensure that LOCs remain unrestricted in order to provide support at the critical time in accordance with the commander’s priorities. Management of the LOCs ensures accountability of personnel and supplies and ensures they reach the decisive point at the correct time and place.

We have discussed the functions of operational logistics they are RSO&I, material management, facility positioning, distribution management, reconstitution, redeployment, and the managing of the LOCs. Next, this monograph will explore current doctrine in regards to OOTW, and future doctrine in regards to Force XXI operations.

#### **Section 4. OOTW Doctrine**

The purpose of this section is to outline the doctrinal implications of OOTW in relation to support operations. Although the army's primary purpose is to fight and win the nations wars, OOTW is the most likely threat the U.S. Military will have to face in the future. OOTW are most likely against an enemy that blends into the local population who is hard to identify and who is asymmetrical in nature. FM 100-5 says this of OOTW,

“Operations other than war often are of long duration and undergo a number of shifts in direction during their course. Immediate solutions to difficult problems may not be obvious or may jeopardize long-term objectives.”<sup>75</sup>

The implications of OOTW for logisticians are in the forms of asymmetrical threat, long lines of communications, greater dispersion of soldiers to support, and austere operating environments. With these factors in mind, OOTW has a set of principles and tenets that are found in U.S. Army doctrine. The principles of OOTW are; objective, unity of effort, legitimacy, perseverance, restraint, and security.<sup>76</sup> The tenets of OOTW are versatility, initiative, agility, depth, and synchronization.<sup>77</sup> The principles and tenets are discussed in the paragraphs below.

Objective is the focusing of military effort on a clearly defined and attainable objective.<sup>78</sup> This is assuring that all military operations contribute to a defined objective. It speaks of the integration of efforts throughout the operation in order to obtain massed effects that are directly related to the accomplishment of the mission. CSS is an enabler of the force to achieve the principle of objective. Further, in OOTW, logistics may be the primary effort of the operation. This may be in the form of direct help to the population, or support to Non Governmental Organizations (NGO) or Private Voluntary Organizations (PVO) in their efforts to bring help to the people.

Unity of effort is the enabler of achieving the objective. Unity of effort is the massing of all resources in the area of operation towards one goal. It is similar to the principle of unity of command,

however, in OOTW, unity of effort may become more difficult due to the number of organizations working in the area. These organizations often have their own agenda which may or may not be similar to the military objective. Further more, another government agency besides the military may have the lead on an OOTW making the military commander subordinate to another government agency. The key to unity of effort is cooperation. Logistic organizations bring with them a robust capability unlike any organization in the world, because of this, it is possible that they may be required to work with diverse organizations. This possibility requires logistic organizations to adhere to the principle of unity of effort. Logistic organizations may find themselves in direct support of NGOs and PVOs or working directly with another government agency like the Federal Emergency Management Agency (FEMA) in their effort to ease domestic suffering.

Legitimacy as defined in FM 100-5 is "Sustain the willing acceptance by the people of the right of the government to govern or of a group or agency to make and carry out decisions."<sup>79</sup> Committed forces must enable the legitimate government to continue to govern. If the forces must make a decision they should be careful to ensure the decision does not detract from the governments legitimacy. Logistics can be used to enhance the legitimacy of a government by providing support to influence the populations belief that their government is taking measures to ensure their well being. This can be done by providing transportation, food, or medical support to name a few.

Perseverance is the preparation for protracted military involvement in order to attain strategic aims. OOTW, as stated earlier in the section, may be of long duration. Commanders must balance their desire for quick decisive outcomes with an understanding of the long term strategic implications. Therefore, commanders must carefully analyze the situation prior to taking action in order to achieve long term strategic objectives. Logisticians must anticipate force requirements in order to support long duration operations. Logistic operations must be able to support increases in operational tempo in order to support the achievement of strategic objectives.

Restraint is using the appropriate military force as the situation dictates. Soldiers trained in conducting wartime operations need considerable training to allow them to operate in an OOTW environment where the Rules of Engagement (ROE) may severely restrict their actions. Further, the ROE may change numerous times during an operation. Use of excessive force may be counter productive to the

principle of legitimacy and may be counter productive to long term strategic goals. CSS units, especially transportation units, find themselves, due to long lines of communications and the dispersed nature of combat units in OOTW missions, relatively isolated in the accomplishment of their support missions. This requires logisticians to ensure they can handle situations that are sometimes explosive in nature. An understanding of the principle of restraint is key for logisticians who find themselves in this situation.

Security, the last principle of OOTW, is the preservation of combat power by ensuring soldiers and equipment are protected. These forces must be prepared for activities that could do harm to U.S. forces and possibly the endangerment of the mission. Logistic assets are soft skinned therefore, these assets provide lucrative targets for terrorists or rebel groups. The operational tempo of logistic organizations in OOTW missions ensures dispersion of logistic assets making them harder to protect.

As stated at the beginning of Section 4, the tenets of OOTW are versatility, initiative, agility, depth, and synchronization. We will discuss each of these tenets in the paragraphs to follow.

Versatility is the ability to shift from one type of operation to another. The implication of versatility is the shifting of focus, tailoring force packages and the ability to move rapidly.<sup>80</sup> For CSS units the implications are the ability to provide tailored logistic packages, increasing sustainment in support of changing operational tempo, or switching logistic operations to support a change in type of OOTW.

Initiative in OOTW implies that the forces conducting these operations control events instead of the environment controlling the events. Commanders conducting OOTW must ensure that belligerents do not control the events to the detriment of the other parties. Logisticians must anticipate requirements in all the possible situations so they are able to support the force commander in achieving his assigned objectives. Further, logisticians must exude the air of impartiality toward all parties.

Agility is the ability to react to actions faster than your opponent. This requires the force commander to anticipate events prior to their occurring. Logisticians must ensure the flexibility in logistic systems and procedures are present to respond to quickly changing situations.

Depth is the ability to conduct simultaneous operations in order to achieve the desired effects. Commanders plan simultaneous activities in time, space, and resources to attain desired effects. For the logistician this translates into the efficient allocation of resources to gain maximum effect. It requires

anticipation, a high degree of management, and good communications to allow the dispersed operation of logistic assets.

Finally, synchronization is the maximum use of all resources to achieve the desired endstate. This involves a great knowledge of how the parties think and react to each other. This knowledge allows the commander to anticipate events, prior to them unfolding, and allocating the appropriate assets to solve the situation. Logistics is a key asset that must be synchronized into any plan. It means the involvement of the logistician in planning operations.

The principles and tenets of OOTW help guide our actions as well as provide some basic truths to the success of OOTW. The next section will cover Force XXI logistic doctrine which will help us understand how the logistic technology of the 21<sup>st</sup> Century will be employed to solve the problems of the future.

## **Section 5. Force XXI Doctrine**

“As armies seek to survive, formations will be more dispersed, contributing to the empty battlefield. Commanders will seek to avoid linear actions, close-in combat, stable fronts, and long operational pauses.”<sup>81</sup> This statement, from TRADOC PAMPHLET (PAM) 525-5, is a challenge in itself to logisticians of the 21<sup>st</sup> century. It implies deep maneuver, nonlinear operations and a dispersion of soldiers not formally seen on any battlefield, past or present. To accommodate this in a constrained environment, CSS operators will need systems that will enable greater efficiencies in logistic operations.

The “common, relevant picture of the battlefield coupled with the information provided by a fully integrated combat service support system (ICS<sup>3</sup>) will allow the Force XXI CSS commander to anticipate requirements and project support further forward than ever before.”<sup>82</sup>

With a more dispersed battlefield, especially in OOTW operations, logisticians must have a greater awareness of the belligerents, his location, and capabilities. Further, the logistician must have the capability to provide “anticipatory, responsive, flexible, and versatile support, while remaining able to ...protect themselves...”<sup>83</sup> This will require greater situational awareness of his own force and a more versatile and flexible organization. With these thoughts in mind the operational logistician will have some tools to help him accomplish his support mission. They are in the forms of technological advances, such as new

equipment, information systems, and logistic concepts, in regards to capabilities and modular organization of support units.

The operational logistician will rely on five new logistic characteristics to plan and execute support to units. The characteristics of the 21<sup>st</sup> century are different in order to effectively deal with the versatility of the threats our forces are expected to face and the political and social environment in which the army now operates. These new characteristics are doctrinal flexibility, strategic mobility, tailorability and modularity of units, joint and multinational connectivity, and the versatility of function.<sup>84</sup>

The advance in information technology will affect the logistician in three major ways. First, he will be able to anticipate logistic requirements better, identify or even predict system breakdowns, and diagnose the problems in systems more efficiently.<sup>85</sup> This speaks directly to being able to manage materiel. Second, he will be able to have greater asset visibility from point of origin to destination of those assets in addition to greater asset visibility throughout the theater.<sup>86</sup> This coupled with increased information about friendly forces will impact on the operational functions of RSO&I, materiel management, distribution management, reconstitution, redeployment, and managing the LOCs. Finally, digitization will allow the logistic commander to command and control CSS functions in near real time through the use of the digitized information systems.<sup>87</sup>

Technological advances will allow the logistician to anticipate both supply and maintenance requirements via appliqué devices installed on the combat vehicles. These devices will be able to show the fuel, ammunition, and maintenance status of each weapon system.<sup>88</sup> This will allow the logistician to anticipate when vehicles will run out of fuel and ammunition, and anticipate when a component will fail. This information will be transmitted from the combat vehicle to the Combat Service Support Control System (CSSCS) in a digitized format. This will allow the operational logistician to act in near real time on the information he receives through the system. Further, the logistician will have visibility of all supplies in theater via the same CSSCS system. This will allow him to utilize support assets more effectively in supporting the commander's priorities as operations are executed. This will greatly enhance the operational function of distribution management.

In order to use logistic assets more efficiently the logistician must know where critical supplies are located in the logistics pipeline. This will be accomplished by a combination of systems. Radio Frequency (RF) tags will allow the logistician to move more supplies by container increasing his mobility while allowing him to identify items in a container increasing his asset visibility. Soldiers will be able to use a laser gun to screen containers which will identify the contents while conserving man power by reducing unnecessary handling of supplies. CSSCS will keep the logistician informed of the status of command critical items and track those command critical items by unit location.<sup>89</sup> This will allow the logistician to react more quickly to a critical item request. It will also help alleviate the burden placed on the supply system when supplies and equipment already on hand are reordered unnecessarily. All of this gives the commander more flexibility, quicker response time for logistics, greater mobility of his logistic assets, and an awareness of the status of critical items.

The digitization of logistic units will help the unit commanders integrate logistic plans and actions more efficiently with force plans and operations. This is accomplished through the Maneuver Control System (MCS). This system will allow the efficient synchronization of the logistic plan with the commander's plans and operations. This system allows the support commander to digitize CSS overlays and orders allowing the timely transmittal of these products to user units and higher headquarters.<sup>90</sup> MCS also allows the logistician an unprecedented situational awareness of the battlefield that he never had before. This will allow the logistician to identify the location of friendly units and belligerents and assist in planning resupply of those units to avoid interference. Coupled with the availability of MCS, the logistician will have the ability, due to in transit visibility, to reroute supply vehicles and divert supplies via the appliqué system.<sup>91</sup> All of these systems ultimately give the commander better and quicker synchronization of logistics, quicker processing time of orders thus allowing the commander to influence the outcome of OOTW, and combat service support systems that are more survivable in theater.

The cornerstone of the Force XXI concept however, is modularity in all CSS units.<sup>92</sup> Modularity is a characteristic of a unit that means the unit is self contained designed to perform a specific function, that can be replaced by another unit of the same design without degradation to the system. Modularity in CSS units ensure a likeness in capabilities and these capabilities are multifunctional in nature so as to permit

plugging a type CSS unit into an organization and have supply, medical, and maintenance functions without the reorganization of many logistic units to fulfill the same purpose. This characteristic enables the commander to build logistic task forces quickly, with all the capability required while still having the same capabilities left for other units it may support. It also allows the logistician to deploy a logistic unit that is not "add hoc", that has a structured chain of command, and works as a team. Modularity allows a smaller support package to deploy while still having all the necessary capabilities to perform its regular support functions. This speaks directly to the ability to deploy these units faster while saving space in the form of strategic lift.

In summary, it is assumed by emerging doctrine that technological systems and modularity of combat service support units will improve efficiency of logistic units markedly. This will give the force commander increased flexibility in the execution of OOTW. Technology will allow the logistician to anticipate requirements more efficiently while utilizing critical supplies and support assets with precision to help the commander achieve his objective. CSSCS, MCS, and sensors will allow the logistician complete visibility of supplies and logistic equipment while giving the him situational awareness of friendly units as well as belligerents. All of this information will allow him to protect his logistic assets while continuing to sustain military forces. Further, this will release the theater from the mountain of material that was required in the past for successful operations.

Force XXI support is expected to be marked by five characteristics. They are doctrinal flexibility, strategic mobility, tailorability and modularity, joint and multinational connectivity, and the versatility of function in War and OOTW.<sup>93</sup>

Doctrinal flexibility is required because of the variance of scenarios that the U.S. Military may encounter. For CSS operations the positioning of units and the way in which support is executed may vary according to the scenario faced. The flexibility derived from having modular units will increase the force commander's options. It will allow the him to weight the battle at the decisive point and to gain more responsive support by placing support units well forward on the battlefield. He will be able to accomplish this because the support units will be smaller and more mobile while still being able to provide a full range of capabilities to the supported unit.

Strategic mobility is an important part of Force XXI doctrine in light of the fact that the U.S. Army is becoming a Continental United States (CONUS) based force. This may require that logisticians both lighten units and use the concept of split-base operations in order to provide robust, continuous logistic operations. Austerity of third world environments where there will be little infrastructure or contracting options to which the army may be deployed requires that support organizations be robust and have a full range of capabilities.

Modular units that are tailorable to many situations are the cornerstone of Force XXI logistics. These organizations must be capable of deploying with limited strategic lift assets. As the army grows smaller but more lethal, there will be a need for fewer support units. These units will be required to be self-contained logistic packages that have the full range of capability.

Joint multinational and interagency connectivity is a must for future operations. The U.S. Army will normally deploy as part of a task force that may include allies. It is important that the logistic system is flexible enough to accommodate their support requirements and allow U.S. forces the ability to plug into their logistic systems when possible.

The future logistic characteristics of Force XXI will enable the planning and execution of logistical operations under a broad range of situations. The future logistician must apply these characteristics to maximize the combat power of the force commander and conform to the operational plans.

In conclusion "Rapid force projection from Continental United States (CONUS), extended lines of communication, and potential entry into logistically bare-based areas of operations require Army development of a logistics system that is versatile, deployable, and expansible."<sup>94</sup> Force XXI logistics will be timely and accurate with full asset visibility realized by accurate reporting through the information systems. The focus for the operational logistician will be forward while having detailed visibility of supplies coming from CONUS. The relevant common picture will allow the CSS units to have greater survivability in OOTW and an ability to anticipate logistic requirements to a greater degree than before.

## **Section 6. Conclusion**

In conclusion, operational logistics are those actions that link strategic logistics to tactical logistics. Further more, current doctrine shows that there are seven operational logistic functions that allow the

operational logistician to provide this link. They are RSO&I of forces into theater, materiel management, facility positioning, distribution management, reconstitution operations, redeployment, and management of the LOCs in theater up to the tactical units. These operational logistic functions will allow us to set a framework for the evaluation of technologies as applied to the lessons learned in Bosnia. Additionally, this section described the principles and tenets of OOTW. The principles are objective, unity of effort, legitimacy, perseverance, restraint, and security. The tenets are versatility, initiative, agility, depth and synchronization.

Future doctrine is based on the ability to use information technology to achieve a decisive advantage and relies on the ability of forces to achieve a new set of characteristics. These characteristics are doctrinal flexibility, strategic mobility, tailorability and modularity of units, joint and multinational connectivity, and the versatility of function. Digitization of logistic units allows the logistician to receive a “common relevant picture” which provides near real time information. The relevant picture allows the logistician to have total visibility over the logistic system by providing asset visibility, equipment visibility and the ability to communicate on a scale not seen before. This ensures the efficient use of resources while allowing the logistician to protect assets from threats.

The next chapter of this monograph will discuss the specific technologies the logistician will have available in the 21<sup>st</sup> century in greater detail and what impacts they will have on the OOTW environment. Later, this will allow us to discuss the lessons learned in Bosnia, using the operational functions of logistics as a framework, and then apply the Force XXI technologies to solve the problems identified.

## **CHAPTER 4: FORCE XXI LOGISTIC TECHNOLOGIES**

These "Combat Service Support (CSS) materiel requirements ... resolve current deficiencies and implement the long-term goals of Force XXI. These are the near-, mid-, and long-term "enablers" needed to achieve required operational capabilities, implement future concepts, and exploit technological opportunities. These initiatives overcome current deficiencies, facilitate goals of power projection, and anticipate the opportunities and challenges of the emerging Force XXI CSS concepts of Battlespace Logistics."<sup>95</sup>

Daniel G. Brown  
Major General  
CASCOM Commander

### **Section 1. Introduction**

The purpose of this chapter is to explore some of the technological advances associated with Force XXI logistics. This portion of the paper will link these advances to improvements in logistic support in the forms of operational functions and the benefits to logisticians. This chapter will be broken into four parts, a general discussion of the benefits of information technology, specific system enhancements, new equipment technologies, and associated future battlefield concepts. At the end of the chapter we will reach a conclusion on the impacts of Force XXI technology on OOTW.

### **Section 2. General Benefits of Information Technology**

The future logistician will have some new tools to help him accomplish his support mission. They are in the forms of technological advances, such as new equipment, information systems, and logistic concepts.

The advance in information technology will affect the logistician in three major ways. First, he will be able to anticipate logistic requirements better, identify or even predict system breakdowns, and diagnose the problems in systems more efficiently.<sup>96</sup> This addresses directly the ability of the logistician to manage materiel in theater in order to sustain OOTW. Second, the logistician will have greater asset visibility from point of origin to destination in addition to greater asset visibility throughout the theater.<sup>97</sup> This will support the operational logistic functions of distribution management and LOC management. Further, by increasing the asset visibility throughout the theater the logistician will be able to execute reconstitution operations more effectively by the quick identification of assets and the effective distribution of those assets to the

critical unit. Finally, digitization will allow the commander to command and control CSS functions in near real time through the use of the digitized information systems<sup>98</sup> which will enhance the ability to execute logistic operations.

Technological advances will allow the logistician to anticipate both supply and maintenance requirements for units via appliqué devices installed on vehicles. These devices will be able to show the fuel, ammunition, and maintenance status of each system.<sup>99</sup> This will allow the logistician to anticipate when vehicles will run out of fuel and ammunition, and when a component will fail. This information will be transmitted from the vehicle to the Combat Service Support Control System (CSSCS) in a digitized format. Further, the logistician will have visibility of all supplies in theater via the same CSSCS system. This will allow him to utilize support assets more effectively in supporting the commander's priorities as operations are executed. The CSSCS will be discussed in greater detail hereafter.

In order to use logistic assets more efficiently, the logistician must know where critical supplies are located in the logistics pipeline. This will be accomplished by a combination of systems. Radio Frequency (RF) tags will allow logisticians to move more supplies by container increasing mobility while allowing identification of specific items in a container. Soldiers will be able to use a laser gun to screen containers to identify the contents thus conserving manpower by reducing unnecessary handling of supplies. CSSCS will keep the logistician informed of the status of command critical items in theater and track those command critical items by unit location.<sup>100</sup> This will allow the logistic system to react more quickly to critical item requests. It will also help alleviate the burden placed on the supply system when supplies and equipment already on hand are reordered unnecessarily. All of this gives the commander more flexibility, quicker response time for logistics, greater mobility of his logistic assets, and an awareness of the status of critical items in theater.

The digitization of logistic units will help the logistician integrate logistic plans and actions more efficiently with the commander's plans and operations. This is accomplished through the Maneuver Control System (MCS), also discussed at greater length hereafter. This system will allow the efficient synchronization of the logistic plan with the theater commander's plans and operations. This system allows the logistician to digitize CSS overlays and orders allowing the timely transmittal of these products to user

units.<sup>101</sup> MCS will give support units an unprecedented situational awareness of the area of operations. It allows the logistician to identify the location of friendly and hostile units and assist in planning resupply of those units to avoid hostile interference. In the case of operations in Bosnia, support units will be able to see the location of mine fields and civil disturbances in theater which will allow them to plan logistic operations while avoiding these hazards. Further, the logistician will have the ability, due to in-transit visibility and MCS, to reroute supply vehicles and divert supplies via the appliqué system.<sup>102</sup> All of these systems ultimately give the commander better and quicker synchronization of logistics efforts.

In summary, technologies will give the commander increased flexibility in the execution of his operations in support of OOTW. Technology will allow the logistician to anticipate requirements, in theater, more efficiently while utilizing critical supplies and support assets with precision to weight the commander's defined decisive points. CSSCS, MCS, and sensors will allow the logistician complete visibility of supplies and logistic equipment while giving him situational awareness of friendly units as well as areas that need to be avoided. All of this information will allow him to protect his logistic assets while giving the best support to units in theater. Further, this will release the theater commander from the mountain of material that was required in the past for successful operations.

### **Section 3. Systems**

The two key systems that increase the logistician's capability to process information and logistic data are the Maneuver Control System (MCS) and the Combat Service Support Control System (CSSCS) already mentioned above. MCS is a system designed for the commander. It is designed to shorten the duration of the decision making cycle.<sup>103</sup> The system is able to do this by applying computer technology to increase the speed of the Military Decision Making Process (MDMP). This enables the logistician to provide logistic plans and orders in conjunction with the commander's plans and orders cycle. This allows the synchronization of CSS assets with maneuver assets. This system also provides the logistician with a Relevant Common Picture (RCP). This is useful to the logistic commander because he will know the location of the supported units as well as his own supporting units. In addition, the RCP shows the logistician where the threats are located that can influence logistic operations. This allows the logistician to

plan for logistic support while avoiding hazards thus giving him a level of force protection not previously seen in OOTW operations.

The CSSCS computer shows the status of supplies in the Major Subordinate Commands (MSCs). The information obtained from the CSSCS system allows the logistician to anticipate shortfalls in critical items that could prevent the commander from obtaining his objective. The system shows the level of supplies using the RED, AMBER, GREEN, BLACK coding method. The color code is based on the percent fill of an item for a unit. The commander determines the percentage based on what conditions constitute a unit that is coded black verses what constitutes a unit that is green for a particular item. Further, the system tracks critical items allowing the commander to see the combat power available. This information will enhance his ability to make decisions based on current or near real time equipment and supply status.<sup>104</sup> All of these aid in decreasing the decision cycle thus allowing the commander to react quickly.

#### **Section 4. Equipment**

Equipment advances also increase the logistician's ability to provide responsive support and directly enhance the ability to execute the operational logistic functions of RSO&I, materiel management, facility positioning, distribution management, reconstitution, redeployment, and management of the LOCs. Some of these new systems include Force Provider, RF tags previously mentioned, Tactical Wheeled Vehicles (TWV), and driver vision enhancers.<sup>105</sup> These are just a few of the new equipment technologies available to the logistician that can be used to increase the effectiveness of support to the commander.

Force Provider is a bare-based deployment system that is used to create quick facilities in austere theaters. This system facilitates the RSO&I, redeployment, and facility positioning functions by providing a system that can be assembled and moved relatively quickly. Force Provider may be used as facilities to support soldiers during reception operations or redeployment operations further, it may be positioned in theater to support units conducting OOTW operations in an austere environment. Because of its modular construction, a Force Provider platoon may set up and operate more than one base camp thus providing support to units that are dispersed. This support system gives the commander flexibility in his options of deployment and maneuver. This system provides showers, dining facilities, recreation, and sleeping quarters

for deployed forces. Although this system is a corps asset, it can be deployed in support of a brigade. Most notably Force Provider is being used in Bosnia. It is relevant in OOTW because it is quick to set up and provides infrastructure that would take considerable engineer support otherwise.

The new family of tactical vehicles will give logisticians more reliable transportation than they have had in the past. The new family of tactical vehicles speak directly to the ability of the logistician to execute the operational logistic function of distribution management. These vehicles, coupled with the new test and diagnostic sets, allow the quick diagnosis of mechanical problems. This will enable the logistician to keep a higher percentage of vehicles mission capable. This translates, for the commander, into more responsive support and flexibility in operations. Coupled with new vehicle technology is the ability to drive in all conditions. The Driver Vision Enhancer (DVE) will allow truck drivers the ability to operate vehicles comfortably at night while employing only tactical lighting thus, providing protection for the driver and the supplies and equipment he carries in the load. This will increase supply effectiveness while increasing the survivability of logistic assets.

## **Section 5. Concepts**

There are two new distribution concepts that seek to improve efficiencies of the supply process. These concepts seek to decrease stockage of items at unit level. These concepts are Velocity Management, and Battlefield Distribution. These two concept support the logistical functions of materiel management, distribution management and management of the LOCs. Velocity Management seeks three things. First, it seeks an improved flow of materials and supplies through the supply system while increasing the accuracy of delivered items ordered. Second, it substitutes shorter processing times, velocity, for large masses of supplies. Lastly, it calls for the improvement of processes by eliminating non producing steps while adding productive steps.<sup>106</sup> This concept allows the logistician to travel lighter, thus frees transportation assets to accomplish other missions while allowing the logistician the ability to keep pace with the ever-changing operation tempo that OOTW can generate. Velocity management enhances strategic mobility and doctrinal flexibility by enabling logistic units to travel lighter and provide support in a variance of scenarios.

Battlefield Distribution (BD) "is a holistic concept that involves limited organizational restructuring to enhance the functionality of units performing distribution management, leveraging improved technology

and re-engineered battlefield operating procedures.”<sup>107</sup> The concept of battlefield distribution provides the logistician with doctrinal flexibility and joint and multinational connectivity by increasing support options and the ability to use joint and host nation assets in this process. The philosophy behind BD is the implementation of a hub and spoke distribution system with a distribution manager at each node.<sup>108</sup> This reduces the layering effect of supply operations and uses throughput and asset visibility technology already discussed. This concept increases the rate of receiving items and reduces transportation asset usage by hauling items to the hub. This concept relies heavily on RF tag technology.

## **Section 6. Conclusion**

In conclusion, the new systems technologies decrease decision making times and increase the efficiency and effectiveness of logistic assets in theater by providing concepts, systems, and equipment which utilize assets in an efficient manner while increasing force protection for those assets. The new logistic technologies enhance the ability of the logistician to execute the operational functions of logistics and enable the execution and planning of logistical operations for OOTW. These same technologies give the logistician greater situational awareness by providing real time information in the forms of supply status and locations of friendly units. Further, these systems provide an awareness of the location of hazards thus preserving the theater logistic assets and providing support that is more reliable and flexible. The equipment technologies enhance this ability by providing reliable equipment that can achieve a higher operational readiness rate which allows the logistician to provide timely and reliable support in OOTW.

The new distribution concepts give the supported unit responsive support while allowing the more effective usage of transportation assets. Velocity Management seeks to reduce the masses of supplies once needed to sustain units in theater thus allowing the effective usage of transportation assets. All of these technologies seek to enhance the responsiveness of the support provided to the commander. They allow logisticians to support with greater visibility of the critical supplies in theater while contributing to the survival of these assets.

Chapter 5 will focus on the lessons learned in Bosnia and analyze the impact of technologies, discussed in this chapter, to ascertain their impact on solving the problems associated with Bosnia. This will

allow us to come to a conclusion on the impact of Force XXI technologies in support of OOTW answering the research question, can Force XXI logistic technology solve the operational logistic problems in Bosnia?

## **CHAPTER 5: FORCE XXI TECHNOLOGY APPLIED TO THE LESSONS LEARNED IN BOSNIA**

“The lack of paved areas in and around Zupanja, Croatia combined with the very real fear of encountering mines off of built up areas, made the sugar beet factory a satisfactory stop gap location for a contingency container yard.”<sup>109</sup>

Contingency Container operations  
Maj. James Herson Jr.  
Transportation Corps Professional Bulletin

### **Section 1. Introduction**

The purpose of this chapter is to identify the lessons learned in Bosnia and apply Force XXI technologies, as they are anticipated to work, to solve the identified problems. This monograph will not identify all of the lessons learned but will identify significant problems associated with each of the operational functions of logistics. In order to identify problems associated with OOTW in Bosnia this monograph will collect lessons learned from Center for Army Lessons Learned (CALL) data, logistic professional journals, and monographs. Because of the nature of operations in Bosnia this monograph will not address the operational logistical function of reconstitution.

### **Section 2. Reception, Staging, Onward Movement, and Integration**

The movement into Bosnia was plagued from the beginning. The implementation time line as outlined by the Dayton Peace Accords, eventually signed in Paris, called for the transformation of authority from NATO peace keepers to the IFOR by D+4 and the occupation of the Zone of Separation (ZOS) by D+30. This caused the IFOR to load combat forces up front in the deployment cycle due to the requirements to immediately start implementation. This also caused the support package, used to operate the ISB, to deploy later in the cycle. Further, the support required for combat units in Bosnia, was required to deploy later in the cycle. This created, according to CALL observers, a desynchronization of several “deployment activities including RSOI and movement control”.<sup>110</sup> The inability to send but a small ISB package to receive the IFOR coupled with the suddenness of the deployment of the force, gave the ISB little time to prepare to receive forces and set up life support facilities in the ISB. Further CALL observers make the following statement about civilian contracting for RSOI operations, “LOGCAP should not be used to

perform Force Reception Onward Movement (FROM) unless resources are committed early enough to allow the contractor to buy materials and hire personnel.”<sup>111</sup> The major problem here is the deployment of a large force into austere environments and the ability or time required to set up basic life support facilities.

The Force XXI solution to the above problem is to deploy Force Provider assets to establish the ISB. These facilities can be used to support soldiers at the ISB until such time that the contractor can build semi permanent or permanent facilities to support ISB operations. As discussed earlier in the monograph, Force Provider is a bare based sustainment package that contains essential life support facilities. These systems may be deployed in support of operations fairly quickly and require some engineer support to set up. The Force Provider company is organized into platoons responsible for running modules that contain dining facility support, living quarters, showers, and recreation facilities. The Force Provider package, although used in Bosnia, is the solution to deployments of forces in austere environments.

Other problems in RSOI operations, also caused by the reorganization of the deployment cycle, was the ability to identify what units were ready to deploy and the misdirection of equipment by rail.<sup>112</sup> The need to identify units ready to deploy out of their normal sequence resulted in the creation of a nondoctrinal deployment board which became the authority to deploy units.<sup>113</sup> Lessons learned from CALL support this problem.<sup>114</sup>

Force XXI technology in the forms of the Combat Service Support Control System (CSSCS) and Radio Frequency (RF) tags could be used to solve these two problems. CSSCS is a system designed to show the status of command critical items and supplies on hand. This system feeds information into the Maneuver Control System (MCS) in the forms of gumball charts. These two systems would give the command information to determine which units were ready for deployment, additionally information from CSSCS would give logisticians the information needed to get high priority units ready to deploy by showing logistical statuses. RF tag technology could be used to track unit equipment to show logisticians where the equipment is located in the deployment cycle. This information could be used to divert equipment to new locations to meet the unit.

### **Section 3. Materiel Management**

Materiel management was a significant problem early on in the Bosnia operation. The lack of a container transfer point that was adequate in facilities, the loss of accountability of pallets and containers due to the resequencing of deploying units, the need to identify the contents of various containers and classification of cargo, the dispersion of base camps in Bosnia, and initial unresponsiveness of shipments of supplies contributed to amplify materiel problems.

As containers and pallets began to arrive in the ISB in Tazar Hungary, and later in the Tactical Assembly Area (TAA) HARMON located in Zupajna Croatia, the backlog of items became overwhelming for an ad hoc organization designed to operate the container yard. Maj. Herson states,

“A makeshift freight forwarding area was set up at the fledging Tazar, Hungary airfield and was initially manned by an ad hoc organization to separate, categorize, and finally transload the growing backlog of containers and pallets being pushed from the Central Region.”<sup>115</sup>

Further, the container facility was placed in an area with inadequate hard stand. This problem would later be solved by the 16<sup>th</sup> Corps Support Group (CSG) who would build a container facility that was central to the hub and spoke distribution system that this monograph will address later in the chapter.

The inability to identify the contents of containers and pallets early in the operation would create a significant back log in the container yard further exasperating the problems associated with space. This problem could be solved by applying RF tag technologies coupled with scanning technologies associated with Force XXI logistics. RF tags would be used to identify the contents of the containers and scanning technology would allow the soldiers to find critical items needed in Bosnia while saving valuable time. RF tag technology would be used later in the Bosnia operation with great success, serving to validate the importance of this technology.

The initial unresponsiveness of the logistic system out of theater is another identified shortfall in logistic operations. In one instance it took 41 days to acquire critical repair parts for the Palletized Loading System (PLS) trucks and Heavy Equipment Transports (HET's) putting the logistic success of operations in Bosnia in serious jeopardy.<sup>116</sup> CALL supports this assertion by saying in the Initial Assessment Report that, “Maintenance and repair parts supply began to surface as key mission essential needs. The system could not support the demands initially placed upon it.”<sup>117</sup>

The problem of long lead times for critical supplies is solved by using velocity management in addition to In Transit Visibility (ITV) and CSSCS. Velocity management is a concept that uses premium transportation for critical items. ITV is the idea of situational awareness of logistic assets from the point of origin to the final destination. The situation is solved by assigning premium transportation (air) to the critical parts and tracking the progress of the parts with technology that will give the position of the parts at any point in time. CSSCS identifies the need for the critical parts by the unit. These systems working in tandem create the ability to requisition, ship, and track the parts throughout the supply system.

#### **Section 4. Facility Positioning**

The positioning of facilities in any operation should be based on infrastructure requirements and the need for facilities to be in the best location to support operations. The facilities in the Bosnia operation were sometimes placed in inadequate locations that did not have the infrastructure to support the operations they were intended to support.

In Major Herson's article, he says that soldiers sometimes slept in houses infested with rodents where "rodents sometimes attacked sleeping soldiers."<sup>118</sup> Further, soldiers were working in areas where the mud in some places was shin deep.<sup>119</sup>

Although this is just a few of the instances of facility positioning, logisticians must remember that a good logistics preparation of the area is essential to the success of logistic operations. The CALL Initial Impression Report confirms this assessment.<sup>120</sup> The MCS can give commanders situational awareness of the terrain in which a unit must operate in. This coupled with knowledge of the local weather conditions, and a good logistics preparation of the battlefield will go a long way to ensure the correct operating areas are selected.

#### **Section 5. Distribution Management, Control of LOCs, and Redeployment**

Distribution management in an area like Bosnia can become a real problem. In OOTW operations distribution efforts may become hampered by terrain, weather, road condition, distribution of units, and unstable domestic situations. In Bosnia all of these occurred. In the winter during the deployment of Task Force Eagle (TFE) the weather conditions were of a harsh nature<sup>121</sup> with snow, ice and freezing

temperatures all contributing to hazardous operations. The lines of communication were especially long with 1,000 miles of road between the Central Region and the area of operations.<sup>122</sup> These long lines of communication present a significant command and control problem coupled with the threat of mine strikes<sup>123</sup> in Bosnia constitute a significant distribution problem.

Logisticians in Bosnia used RF tag technology and the concept of Battlefield Distribution with its hub and spoke distribution system to overcome distribution challenges. The relevant common picture associated with the MCS system is a significant force protection asset as it can identify locations of known mine fields and make that information known to all unit commanders. Force protection in the sense that the vehicle operator may be redirected from his current route to an alternate route if problems occur on the primary route. As stated earlier, there was no rear area in Bosnia. The threat from rebels and riots are real. Force XXI technology is a way to improve the chances of success by having situational awareness down to the individual operator level.

The same technology as stated above is the key to controlling the LOCs. Instantaneous awareness of the LOCs in regards to the status of the roads, traffic, and threat are key. In Bosnia knowledge of the conditions of the roads if appliqué and MCS are available is made simpler by reports generated by the drivers that are currently utilizing the route. This information may be input into the MCS to add detail to the relevant common picture of the area of operations.

In the area of Redeployment operations, Force XXI technology is instrumental in the tracking of equipment from theater to home station. RF tag technology was used to redeploy unit's equipment back from Bosnia. This technology increases the speed at which units can retrieve their equipment from operations which allows them to recover quicker and facilitates preparation for future operations.

## **Section 6. Conclusion**

In conclusion, Force XXI technologies enhance the logisticians ability to sustain OOTW operations. RF tag technologies as part of TAV ensures the logistician has asset visibility of supplies and equipment from point of origin to destination. Systems such as MCS and CSSCS ensure that all commanders see the relevant common picture and have knowledge of assets in the area of operations. The hub and spoke distribution as part of the battlefield distribution concept ensures the efficient movement of

materials and supplies throughout the theater of operations. Systems such as appliqué help ensure force protection of critical CSS assets by providing a way to command and control these assets over great distances. All of these concepts would have been useful in conducting operations in Bosnia by providing a relevant common picture to all units, which allow freedom of movement, protection of assets and personnel, visibility of supplies throughout theater which ultimately contribute to the accomplishment of the commanders goals and objectives.

The final chapter of this monograph will come to a conclusion and answer the research question, can Force XXI logistic technology solve the operational logistic problems in Bosnia? The conclusion will further outline the impacts of Force XXI technology on OOTW.

## CHAPTER 6: CONCLUSIONS

The research question is; can Force XXI logistic technology solve the operational logistic problems in Bosnia? The implications of this technology are in the forms of support to the operational logistic functions of RSOI, materiel management, facility positioning, distribution management, reconstitution, redeployment, and management of the LOCs to the tactical units. The benefits of Force XXI technology are increased asset visibility from point of origin to destination, greater situational awareness of the area in which OOTW is occurring, reduced order ship times due to distribution methods and velocity management, and greater force protection of assets due to increased situational awareness and the ability to command and control assets over an extended area. All of these benefits would have increased support to forces conducting operations in Bosnia and increased the ability of the logistician to conduct support operations in OOTW. In fact, some of this technology such as battlefield distribution, Force Provider, and radio frequency technologies were used with success to increase the support to units in the field. These technologies as currently exist gave the logisticians in theater better visibility of materials in the supply system, more efficient use of limited transportation assets, and the ability to support basic life support needs in an austere environment.

Information systems, coupled with sensor technologies, would increase the logisticians ability to gain asset visibility of supplies in the theater allowing quicker reaction time and increased support to the commander's operations. These systems allow the logistician to increase the tempo of operations in OOTW. Further, these systems seek to increase the situational awareness of critical supplies and equipment throughout the levels of command. These same systems increase the level of force protection to logistic assets operating in a dispersed manner throughout the operational area. Situational awareness in Bosnia would allow logisticians real time information on suspected mine fields and problems along the LOCs. Better command and control systems would ensure flexibility and the ability of logisticians to reroute logistic traffic avoiding potential problems associated with OOTW operations. The addition of MCS gives the logistician the ability to synchronize logistic activities to support the commander's critical priorities.

In conclusion, all of these technologies working in tandem would increase the logisticians ability to solve the operational logistic problems associated with OOTW operations in Bosnia. Although each OOTW

operation is different, these technologies add flexibility, awareness, and force protection of logistic assets in theater while enabling logisticians to operate in a dispersed environment that is austere in nature. Bosnia is only one example, however, the effects of Force XXI technologies can be applied to different scenarios with the same results. Force XXI technology would solve many of the operational logistic problems in Bosnia as well as show similar results in other OOTW scenarios.

## ENDNOTES

- <sup>1</sup> United States Army Training and Doctrine Command, TRADOC PAMPHLET 525-5, Force XXI Operations, (Fort Monroe, VA: 1994), 1-1.
- <sup>2</sup> U.S. Army Field Manual 100-1, The Army, (Washington D.C.: U.S. Government Printing Office, June, 1994), 2.
- <sup>3</sup> John Zametica, "The Yugoslav Conflict", (Adelphi Paper 270, International Institute for Strategic Studies, United Kingdom: Brassey's, 1992), 6.
- <sup>4</sup> Alex N. Dragnich, "Serbs and Croats", (New York: Harcourt Brace and Company, 1992), 35.
- <sup>5</sup> John Zametica, "The Yugoslav Conflict" 1992, 2.
- <sup>6</sup> H. C. Darby, et al, "A Short History of Yugoslavia", (Cambridge: Cambridge University Press, 1966), I.
- <sup>7</sup> Ibid., 9.
- <sup>8</sup> Ibid., 9.
- <sup>9</sup> Federal Research Division, "Yugoslavia: A Country Study", (Edited by Glenn E. Curtis, U.S. Government Printing Office, 1992), 107.
- <sup>10</sup> Ibid., 12.
- <sup>11</sup> Ibid., 112.
- <sup>12</sup> John Zametica, "The Yugoslav Conflict" 1992, 25.
- <sup>13</sup> H. C. Darby, et al, "A Short History of Yugoslavia" 1966, 100.
- <sup>14</sup> Ibid., 15.
- <sup>15</sup> Ibid., 16.
- <sup>16</sup> Ibid., 11.
- <sup>17</sup> Federal Research Division, "Yugoslavia: A Country Study" 1992, 8.
- <sup>18</sup> Ibid., 11.
- <sup>19</sup> Ibid., 17-18.
- <sup>20</sup> Ibid., 18.
- <sup>21</sup> Ibid., 12.
- <sup>22</sup> Robert Thomas, "Serbia: Still Europe's Pariah?", (Institute For European Defence and Strategic Studies: Alliance Publishers, 1996), 11.
- <sup>23</sup> Misha Glenny, "The Fall of Yugoslavia", (New York: Penguin Books USA, 1992), 2.
- <sup>24</sup> Federal Research Division, "Yugoslavia: A Country Study" 1992, 14. Information is also found in H. C. Darby, et al, "A Short History of Yugoslavia" 1966, 18.
- <sup>25</sup> H. C. Darby, et al, "A Short History of Yugoslavia" 1966, 9.
- <sup>26</sup> John Zametica, "The Yugoslav Conflict" 1992, 8.
- <sup>27</sup> Federal Research Division, "Yugoslavia: A Country Study" 1992, 32-33.
- <sup>28</sup> H. C. Darby, et al, "A Short History of Yugoslavia" 1966, 181.
- <sup>29</sup> John Zametica, "The Yugoslav Conflict" 1992, 8.
- <sup>30</sup> Ibid., 8.
- <sup>31</sup> Ibid., 9.
- <sup>32</sup> Ibid., 9.
- <sup>33</sup> Ibid., 14.
- <sup>34</sup> Ibid., 41.
- <sup>35</sup> Ibid., 44.
- <sup>36</sup> Ibid., 45.
- <sup>37</sup> Initial Impressions Report, "Operation Joint Endeavor: Task Force Eagle Initial Operations", (Fort Leavenworth KS: Center for Army Lessons Learned, May 1996), A-1.
- <sup>38</sup> Ibid., A-1. The dates and times of the NATO involvement in the Bosnian conflict are located in Annex A of the Initial Impression Report. Some of the actions combined in the text involve multiple dates. I have chose to footnote key dates. Readers are advised that facts in this section of the Monograph are taken from the above annex.
- <sup>39</sup> Ibid., A-1.
- <sup>40</sup> Ibid., A-1.
- <sup>41</sup> Ibid., A-2.

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- <sup>42</sup> Ibid., ix.
- <sup>43</sup> Ibid., 22.
- <sup>44</sup> Ibid., ix.
- <sup>45</sup> Bruce E. Akard, "Strategic Deployment: An Analysis of How the United States Army Europe Deployed VII Corps to Southwest Asia and the 1<sup>st</sup> Armored Division to Bosnia", (Fort Leavenworth KS: MMAS, 1997), 45.
- <sup>46</sup> Initial Impression Report, "Operation Joint Endeavor: Task Force Eagle Initial Operations" 1996, 35.
- <sup>47</sup> Bruce E. Akard, "Strategic Deployment: An Analysis of How the United States Army Europe Deployed VII Corps to Southwest Asia and the 1<sup>st</sup> Armored Division to Bosnia" 1997, 54.
- <sup>48</sup> Initial Impression Report, "Operation Joint Endeavor: Task Force Eagle Initial Operations" 1996, 76.
- <sup>49</sup> Ibid., 168-169.
- <sup>50</sup> U.S. Army, Field Manual 100-5, Operations, (Washington D.C.: U.S. Government Printing Office, 1993), 1-1 - 1-2.
- <sup>51</sup> U.S. Army Final Draft of Field Manual 100-5, Operations, (Washington D.C.: U.S. Government Printing Office, 1997) 1-3.
- <sup>52</sup> U.S. Army Field Manual 100-5, Operations, 1993, 6-2.
- <sup>53</sup> Carl Von Clausewitz, "On War" (Translated and Edited by Michael Howard and Peter Paret, Princeton: Princeton Press, 1987), 69.
- <sup>54</sup> U.S. Army Final Draft of Field Manual 100-5, Operations, 1997, 2-6.
- <sup>55</sup> James J. Schneider, "Theoretical Paper No. 3: The Theory of Operational Art" (Fort Leavenworth: U.S. Army Command and General Staff College, 1988), 16-18.
- <sup>56</sup> Carl Von Clausewitz, "On War", 1987, 595.
- <sup>57</sup> U.S. Army Field Manual 100-16, Army Operational Support, (Washington D.C.: U.S. Government Printing Office, 1995), 3-7.
- <sup>58</sup> Ibid., 3-1.
- <sup>59</sup> U.S. Army Field Manual 100-5, Operations, 1993, 12-2.
- <sup>60</sup> U.S. Army Final Draft of Field Manual 100-5, Operations, 1997, 11-4.
- <sup>61</sup> U.S. Army Field Manual 100-7, Decisive Force: The Army in Theater Operations, (Washington D.C.: U.S. Government Printing Office, 1995), 5-20.
- <sup>62</sup> U.S. Army Field Manual 100-8, The Army in Multinational Operations, (Washington D.C.: U.S. Government Printing Office, 1997), 3-5.
- <sup>63</sup> U.S. Army Field Manual 100-16, Army Operational Support, (Washington D.C.: U.S. Government Printing Office, 1995), 3-7.
- <sup>64</sup> U.S. Army Field Manual 100-8, The Army in Multinational Operations, 1997, 3-1.
- <sup>65</sup> Ibid., 3-2.
- <sup>66</sup> Ibid., 3-2.
- <sup>67</sup> Ibid., 3-2.
- <sup>68</sup> U.S. Army Field Manual 100-7, Decisive Force: The Army in Theater Operations, 1995, A-24.
- <sup>69</sup> U.S. Army Field Manual 100-16, Army Operational Support, 1995, C-0.
- <sup>70</sup> Ibid., C-0.
- <sup>71</sup> Ibid., C-0.
- <sup>72</sup> Ibid., 3-12
- <sup>73</sup> Ibid., 3-12 - 3-13.
- <sup>74</sup> U.S. Army Field Manual 100-17, Mobilization, Deployment, Redeployment, Demobilization, (Washington D.C.: U.S. Government Printing Office, 1992), 5-0.
- <sup>75</sup> U.S. Army Field Manual 100-5, Operations, 1993, 13-0.
- <sup>76</sup> Ibid., 13-3 - 13-4.
- <sup>77</sup> U.S. Army Field Manual 100-23, Peace Operations, (Washington D.C.: U.S. Government Printing Office, 1994), 18-19.
- <sup>78</sup> U.S. Army Field Manual 100-5, Operations, 1993, 13-3. The definitions for the principles for OOTW can be found in chapter 13, of FM 100-5. The tenets are defined in FM 100-23, Peace Operations, 1994. For the purpose of this monograph principles are basic truths while tenets are characteristics that define successful operations.

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- <sup>79</sup> Ibid., 13-4.
- <sup>80</sup> U.S. Army Field Manual 100-23, Peace Operations, 1994, 19.
- <sup>81</sup> TRADOC PAMPHLET 525-5, Force XXI Operations, August 1994, 2-9.
- <sup>82</sup> Ibid., 1-9.
- <sup>83</sup> CSS Operations In Support of Force XXI Division Redesign, Final Draft, (Fort Lee, VA: Combined Arms Support Command, September 1996), 1-9.
- <sup>84</sup> TRADOC PAMPHLET 525-200-6, Combat Service Support, (Fort Monroe, VA: United States Army Training and Doctrine Command, August 1994), 5.
- <sup>85</sup> U.S. Army Maintenance XXI Concept, (Fort Lee VA: Combined Arms Support Command, April 1997), 6, para 3-4. This information was obtained on the CASCOM home page at [www.cascom.army.mil](http://www.cascom.army.mil).
- <sup>86</sup> CSS Operations In Support of Force XXI Division Redesign, Final Draft, 1996, 1-9.
- <sup>87</sup> Ibid., 1-9. This information is also available on the CASCOM web site at <http://132.159.36.16/about.htm>. It is an information sheet on CSSCS.
- <sup>88</sup> Ibid., 3-2.
- <sup>89</sup> This information was obtained by hands on practical experience during Prairie Warrior 97 working as the Discom Support Operations Officer for the Mobile Strike Force.
- <sup>90</sup> This information was gathered through hands on experience during Prairie Warrior 97 by FTPing the Discom's support overlays on the MCS.
- <sup>91</sup> CSS Operations In Support of Force XXI Division Redesign, Final Draft, 1996, 3-1.
- <sup>92</sup> Ibid., 1-9.
- <sup>93</sup> Ibid., 3-1.
- <sup>94</sup> TRADOC PAMPHLET 525-200-6, Combat Service Support, 1994, 3.
- <sup>95</sup> This statement is from the CASCOM executive summary located on the CASCOM home page at [http://www.cascom.army.mil/multi/materiel/css\\_Materiel\\_Master\\_Plan/](http://www.cascom.army.mil/multi/materiel/css_Materiel_Master_Plan/). The executive summary is part of the CASCOM Combat Service Support Materiel Master Plan. General Brown's statement is located on page two.
- <sup>96</sup> Combined Arms Support Command Draft of, U.S. Army Maintenance XXI Concept, (Fort Lee VA: 1997), 6, para 3-4. This information was obtained on the CASCOM home page at [www.cascom.army.mil](http://www.cascom.army.mil).
- <sup>97</sup> Combined Arms Support Command Final Draft, CSS Operations In Support of Force XXI Division Redesign, 1996, 1-9.
- <sup>98</sup> Ibid., 1-9. This information is also available on the CASCOM web site at <http://132.159.36.16/about.htm>. It is an information sheet on CSSCS.
- <sup>99</sup> Ibid., 3-2.
- <sup>100</sup> This information was obtained by hands on practical experience during Prairie Warrior 97 working as the Discom Support Operations Officer for the Mobile Strike Force.
- <sup>101</sup> This information was gathered through hands on experience during Prairie Warrior 97 by FTPing the Discom's support overlays on the MCS.
- <sup>102</sup> Combined Arms Support Command Final Draft, CSS Operations In Support of Force XXI Division Redesign, 1996, 3-1.
- <sup>103</sup> United States Army Training and Doctrine Command, Operational Requirements Document (ORD) For Maneuver Control System (MCS), (Fort Monroe, VA: August 1995), 1. This document was retrieved off the TRADOC web site with a sub directory off the MCS web site.
- <sup>104</sup> The information on the CSSCS computer came from personal experience working directly with the system during Prairie Warrior 97. Further information was located on the CASCOM web site at <http://132.159.36.16/about.htm>
- <sup>105</sup> Combined Arms Support, Combat Service Support Material Master Plan, (Fort Lee, VA:), 5-8.
- <sup>106</sup> Combined Arms Support Command Briefing on , Velocity Management, (Fort Lee, VA:), 1. This briefing is found on the CASCOM web site at [www.cascom.army.mil](http://www.cascom.army.mil)
- <sup>107</sup> Combined Arms Support Command an information paper on, Battlefield Distribution, (Fort Lee, VA:), 1.
- <sup>108</sup> Ibid., 1.
- <sup>109</sup> James Herson, Jr., "Operation Joint Endeavor: Contingency Container Operations", Transportation Corps Professional Bulletin, Summer 1997, 16.

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- <sup>110</sup> David A. Fastabend, et al. "Operation Joint Endeavor" Initial Operations, (Center For Army Lessons Learned (CALL), Fort Leavenworth KS, May 1996), 4-5.
- <sup>111</sup> Ibid., 7.
- <sup>112</sup> Bruce E. Akard, "Strategic Deployment: An Analysis of How the United States Army Europe Deployed VII Corps to Southwest Asia and the 1<sup>st</sup> Armored Division to Bosnia" (Command and General Staff College, Fort Leavenworth KS, 1997), 53.
- <sup>113</sup> Ibid., 56.
- <sup>114</sup> David A. Fastabend, et al. "Operation Joint Endeavor" Initial Impression Report, May 96, 159.
- <sup>115</sup> James Herson, Jr., "Operation Joint Endeavor: Contingency Container Operations", 1997, 15.
- <sup>116</sup> James P. Herson, Jr., "Road Warriors in the Balkans" Army Logistician, March-April 1997, 28.
- <sup>117</sup> David A. Fastabend, et al. "Operation Joint Endeavor" Initial Impression Report, May 96, 125.
- <sup>118</sup> James Herson, Jr., "Operation Joint Endeavor: Contingency Container Operations", 1997, 16.
- <sup>119</sup> Ibid., 17.
- <sup>120</sup> David A. Fastabend, et al. "Operation Joint Endeavor" Initial Impression Report, May 96, 2.
- <sup>121</sup> James Herson, Jr., An Unpublished Unit History 181<sup>st</sup> Transportation Battalion, December 1996, Section 2, 14.
- <sup>122</sup> James Herson, Jr., "Operation Joint Endeavor: Contingency Container Operations", 1997, 15.
- <sup>123</sup> David A. Fastabend, et al. "Operation Joint Endeavor" Initial Impression Report, May 96, 35.

## BIBLIOGRAPHY

### Books

- Bennet, Christopher. Yugoslavia's Bloody Collapse: Causes, Course and Consequences. London: C. Hurst and Company, 1995.
- Clausewitz, Carl von. On War. Translated and Edited by Michael Howard and Peter Paret. Princeton: Princeton Press, 1987.
- Darby, H. C. et al. A Short History of Yugoslavia. Cambridge: Cambridge University Press, 1966.
- De Landa, Manuel. War in the Age of Intelligent Machines. New York: Zone Books, 1991.
- Dragnich, Alex N. Serbs and Croats. New York: Harcourt Brace and Company, 1992.
- Federal Research Division, Yugoslavia: A Country Study. Glenn E. Curtis ed., Washington DC: U.S. Government Printing Office, 1992.
- Glenny, Misha. The Fall of Yugoslavia: The Third Balkan War. New York: Penguin Books, 1992.
- Janes Information Group. Bosnia Country Study. London: Janes Publishing, 1993.
- Kaplan, Robert. Balkan Ghosts. New York: St. Martins Press, 1993.
- Laffan, R. G. D. The Serbs: Guardians of the Gate. New York: Dorset Press, 1989.
- Magruder, Carter B. Recurring Logistics Problems As I Have Observed Them. Washington, DC: U.S. Government Printing Office, 1991.
- MacKenzie, Lewis. Peacekeeper: The Road to Sarajevo. Vancouver: Douglas and McIntyre, 1993.
- Owen, David. Balkan Odyssey. New York: Harcourt Brace and Company, 1995.
- Rieff, David. Slaughterhouse: Bosnia and the Failure of the West. New York: Simon and Schuster, 1995.
- Rosen, Stephen P. Winning the Next War. New York: William Marrow, 1980.
- Senge, Peter M. The Fifth Discipline: The Art & Practice of the Learning Organization. New York: Doubleday, 1990.

Sullivan, Gordon R. and James M. Dubik. Envisioning Future War. Fort Leavenworth, KS: U.S. Army Command and General Staff College Press, 1995.

Sun Tzu. The Art of War. Translated by Samuel B. Griffith, London: Oxford University Press, 1963.

Thomas, Robert Serbia: Still Europe's Pariah? Institute for European Defence and Strategic Studies: Alliance Publishers, 1996.

Woodward, Susan L. Balkan Tragedy: Chaos and the Dissolution After the Cold War. Washington DC: Brookings Institute, 1995.

Zametica, John The Yugoslav Conflict. United Kingdom, International Institute for Strategic Studies: Brassey's, 1992.

### **Monographs and Papers**

Akard, Bruce E. Strategic Deployment: An Analysis of How the United States Army Europe Deployed VII Corps to Southwest Asia and the 1<sup>st</sup> Armored Division to Bosnia. U.S. Army Command and General Staff College, Fort Leavenworth KS, 1997

Bergeron, Scott M. Revolution in Military Logistics: No More Mountains to Move? Personal Experience Monograph. Carlisle Barracks: U.S. Army War College, 1995.

Dumond, John. etal. Velocity Management An Approach for Improving the Responsiveness and Efficiency of Army Logistics Process. Rand Arroyo Center. Santa Monica, CA, 1995.

Fallon, Michael J. The United Nations Protection Force's Effectiveness in Bosnia: Campaign Planning and Peacekeeping. U.S. Army Command and General Staff College, Fort Leavenworth KS, 1996.

Fuller, David L. U.S. Army Logistics in the 21<sup>st</sup> Century and the Challenge of Change. Carlisle Barracks: U.S. Army War College, May 1995.

James, Thomas s. Big Tank Little Bridge: Is There a Position on the Peace Operations Team for Heavy Armor. School of Advanced Military Studies, Command and General Staff College, Fort Leavenworth KS, 1996.

Johnson, Jerome. Logistics Distribution: Key to Operational Success. School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth KS. 1993.

- Lapham, Curtis A. Uncle Sam Deploys to Bosnia: United States National Security Interest in Bosnia. School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth KS, 1997.
- Mott, J.R. Logistics Distribution in a Theater of Operation. School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth KS, 1993.
- Rentz, James E. Will the Objective Supply Capabilities System Enhance the Performance of the Army's Class IX Supply System in the Year 2000 and Beyond? U.S. Army Command and General Staff College, Fort Leavenworth KS, 1992.
- Schneider, James J. Theoretical Paper No. 3: The Theory of Operational Art. U.S. Army Command and General Staff College, Fort Leavenworth KS, 1988.
- Seastrom, Mark R. What Strategic Considerations Should Affect A Decision By The United States to Intervene With Military Force in Bosnia-Herzegovina. U.S. Army Command and General Staff College, Fort Leavenworth KS, 1993.
- Shambach, Stephen A. Force XXI and Peace Operations. Strategy Research Project, Carlisle Barracks, U.S. Army War College, 1996.
- Stewart, Stephen G. Safe Areas in Bosnia: Their impact on the UN PeaceKeeping Operation and the Bosnian Civil War. U.S. Army Command and General Staff College, Fort Leavenworth KS, 1996.
- Young, Robert G. The Impact of Operations other Than War on the Midgrade (O-3/4) Army Officers. U.S. Army Command and General Staff College, Fort Leavenworth KS, 1997.

#### **Periodical Articles**

- Akin, George G. "Battlefield Distribution" Army Logistician, (January-February 1996), 6-7.
- Anderson, Nicholas J. "Multinational Deployments in Operation Joint Endeavor", Army Logistician. (1996), 21-23.
- Boge, Walter E. and Leonard I Huskey. "Corps Support to Force XXI", Army RD&A. (March-April 1995), 7-9.
- Breneau, Norman P., etal. "Force Provider Deploys to Hell in a Cold Place", Quartermaster Professional Bulletin. (Summer 1996), 7-13.

- Coburn, John G. "Focused Logistics-Projecting and Sustaining Force XXI", Army. Vol. 46 (October 1996), 127-132.
- Herson, James, Jr. "An Unpublished Unit History 181<sup>st</sup> Transportation Battalion", (December 1996), Section 2.
- Herson, James, Jr. "Operation Joint Endeavor: Contingency Container Operations", Transportation Corps Professional Bulletin. (Summer 1997), 15-19.
- Herson, James, Jr. "Road Warriors in the Balkans", Army Logistician. (March-April 1997), 23-28.
- Jablonsky, David. "US Military Doctrine and the Revolution in Military Affairs", Parameters. Vol. XXIV No. 3 (Autumn 1994), 18-36.
- Kelly, Michael P. "CSSCS (Combat Service Support Control System)", Army Logistician. (July-August 1995), 32-33.
- Lehner, Charles. "Task Force Eagle's Armor and Cavalry Operations in Bosnia", Armor. (May-June 1996), 9-10, 45-47.
- McDuffie, John M. "Force XXI Corps Support", Army Logistician. (July-August 1995), 26-31.
- McGhee, Michael L. "Just in Time, or Just Too Late", Army Logistician. (March-April 1994), 15-17.
- Monroe, James W. "Ordnance Vision XXI-Force XXI Enabler", Army Logistician. (November-December 1995), 8-10.
- Parker, Daniel C. and Jim Caldwell. "Battlefield Distribution for Force XXI", Army Logistician. (July-August 1995), 36-38.
- Robinson, Thomas W. "Pipeline Vision for Force XXI", Army Logistician. (July-August 1995), 22-25.
- Robinson, Thomas W. "Velocity Management: An Initiative to Improve the Army Logistics System", Army Logistician. (May-June 1995), 10-11.
- Rose, Sir Michael. "A Year in Bosnia: What Has Been Achieved", The RUSI Journal. (March 1995), 21-24.

## Government Publications

CSS Operations In Support of Force XXI Division Redesign. Final Draft, Combined Arms Support Command, Fort Lee VA, 19 June 1996.

Field Manual 63-3, Corps Support Command. Headquarters, Department of the Army, Washington DC, 30 September 1993.

Field Manual 100-1, The Army. Headquarters, Department of the Army, Washington DC, June 1994.

Field Manual 100-5, Operations. Headquarters, Department of the Army, Washington DC, 14 June 1993.

Field Manual 100-5, Final Draft, Operations. Headquarters, Department of the Army, Washington DC, 1997.

Field Manual 100-7, Decisive Force: The Army in Theater Operations. Headquarters, Department of the Army, Washington DC, 1995.

Field Manual 100-8, The Army in Multinational Operations. Headquarters, Department of the Army, Washington DC, 1997.

Field Manual 100-10, Combat Service Support. Headquarters, Department of the Army, Washington DC, 18 February 1988.

Field Manual 100-16, Army Operational Support. Headquarters, Department of the Army, Washington DC, May 1995.

Field Manual 100-17, Mobilization, Deployment, Redeployment, Demobilization. Headquarters, Department of the Army, Washington DC, 1992.

Field Manual 100-23, Peace Operations. Headquarters, Department of the Army, Washington DC, 1994.

Initial Impressions Report, Operation Joint Endeavor: Task Force Eagle Initial Operations. Fort Leavenworth KS: Center for Army Lessons Learned, May 1996.

TRADOC PAMPHLET 525-5, Force XXI Operations. Headquarters, United States Army Training and Doctrine Command, Fort Monroe VA, 1 August 1994.

TRADOC PAMPHLET 525-200-6, Combat Service Support. Headquarters, United States Army Training and Doctrine Command, Fort Monroe VA, 1 August 1994.